Package: ConfidenceEllipse (via r-universe)

September 2, 2024

Type Package

Title Computation of 2D and 3D Elliptical Joint Confidence Regions

Version 1.0.0

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Description Computing elliptical joint confidence regions at a
specified confidence level. It provides the flexibility to
estimate either classical or robust confidence regions, which
can be visualized in 2D or 3D plots. The classical approach
assumes normality and uses the mean and covariance matrix to
define the confidence regions. Alternatively, the robustified
version employs estimators like minimum covariance determinant
(MCD) and M-estimator, making them less sensitive to outliers
and departures from normality. Furthermore, the functions allow
users to group the dataset based on categorical variables and
estimate separate confidence regions for each group. This
capability is particularly useful for exploring potential
differences or similarities across subgroups within a dataset.
Varmuza and Filzmoser (2009, ISBN:978-1-4200-5947-2). Johnson
and Wichern (2007, ISBN:0-13-187715-1). Raymaekers and
Rousseeuw (2019) <DOI:10.1080/00401706.2019.1677270>.

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Encoding UTF-8

LazyData true

RoxygenNote 7.3.1

Imports cellWise, dplyr, forcats, ggplot2, magrittr, pcaPP, purrr,
rgl, rlang, stats, tibble, tidyr, tidyselect

Roxygen list(markdown = TRUE)

URL https://christiangoueguel.github.io/ConfidenceEllipse/,
https://github.com/ChristianGoueguel/ConfidenceEllipse

Suggests knitr, rmarkdown, spelling, testthat (>= 3.0.0)

VignetteBuilder knitr

Depends R (>= 2.10)

Language en-US

Config/testthat/edition 3

BugReports https://github.com/ChristianGoueguel/ConfidenceEllipse/issues

Repository https://christiangoueguel.r-universe.dev

RemoteUrl https://github.com/christiangoueguel/confidenceellipse

RemoteRef HEAD

RemoteSha cf5e9c3fb94bd93a01fd3b9769c06bf93d1c15ed

Contents

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confidence_ellipse   *Confidence Ellipse Coordinates*

Description

Compute the coordinate points of confidence ellipses at a specified confidence level.

Usage

```
confidence_ellipse(
  .data,
  x,
  y,
  .group_by = NULL,
  conf_level = 0.95,
  robust = FALSE
)
```

Arguments

.data	data frame or tibble.
x	column name for the x-axis variable.
y	column name for the y-axis variable.
.group_by	column name for the grouping variable (NULL by default). Note that this grouping variable must be a factor.
conf_level	confidence level for the ellipse (0.95 by default).

robust optional (FALSE by default). When set to TRUE, it indicates that robust estimation method is employed to calculate the coordinates of the ellipse. The location is the 1-step M-estimator with the biweight psi function. The scale is the Minimum Covariance Determinant (MCD) estimator. Raymaekers and Rousseeuw (2019).

Value

Data frame of the coordinates points.

Author(s)

Christian L. Goueguel

Examples

```
# Data
data("glass", package = "ConfidenceEllipse")
# Confidence ellipse
ellipse <- confidence_ellipse(.data = glass, x = SiO2, y = Na2O)
ellipse_grp <- confidence_ellipse(
.data = glass,
x = SiO2,
y = Na2O,
.group_by = glassType
)
```

---

confidence_ellipsoid   *Confidence Ellipsoid Coordinates*

Description

Compute the coordinate points of confidence ellipsoids at a specified confidence level.

Usage

```
confidence_ellipsoid(
  .data,
  x,
  y,
  z,
  .group_by = NULL,
  conf_level = 0.95,
  robust = FALSE
)
```

Arguments

`.data`	data frame or tibble.
`x`	column name for the x-axis variable.
`y`	column name for the y-axis variable.
`z`	column name for the z-axis variable.
`.group_by`	column name for the grouping variable (`NULL` by default). Note that this grouping variable must be a factor.
`conf_level`	confidence level for the ellipsoid (0.95 by default).
`robust`	optional (`FALSE` by default). When set to `TRUE`, it indicates that robust estimation method is employed to calculate the coordinates of the ellipsoid. The location is the 1-step M-estimator with the biweight psi function. The scale is the Minimum Covariance Determinant (MCD) estimator. Raymaekers and Rousseeuw (2019).

Value

Data frame of the coordinate points.

Author(s)

Christian L. Goueguel

Examples

```
# Data
data("glass", package = "ConfidenceEllipse")
# Confidence ellipsoid
ellipsoid <- confidence_ellipsoid(.data = glass, x = SiO2, y = Na2O, z = Fe2O3)
ellipsoid_grp <- confidence_ellipsoid(
.data = glass,
x = SiO2,
y = Na2O,
z = Fe2O3,
.group_by = glassType
)
```

---

glass   *Glass Vessels Data*

Description

The dataset is comprised of 13 different measurements for 180 archaeological glass vessels from different groups (Janssen, K.H.A., De Raedt, I., Schalm, O., Veeckman, J.: Microchim. Acta 15 (suppl.) (1998) 253-267. Compositions of 15th - 17th century archaeological glass vessels excavated in Antwerp.).

Usage

```
glass
```

Format

Data frame of 180 rows and 14 columns.

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